Radiation-induced Cancer Risk: Timing Is Important

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By Whitney L. Jackson [2]

Pari Pandharipande, MD, explores the importance of considering the timing of when a patient experiences a disease and incurs radiation-induced cancer risks.

Are medical imaging tests as dangerous — or perhaps more so — than the disease they’re used to detect? It’s a question often asked by patients, referring physicians, and the news media. As radiologists have acknowledged the risk associated with CT scans, the industry has taken steps to keep doses as low as possible without compromising the quality of the study.

However, when making decisions about the use of certain imaging, the timing of radiation-induced cancer risks is also important to consider, according to Harvard assistant professor of radiology Pari Pandharipande, MD, MPH. In the January 2013 issue of *Radiology*, Pandharipande, also an abdominal radiologist at Massachusetts General Hospital, and her colleagues explored the importance of considering the relative timing of when a patient experiences a disease and when they incur radiation-induced cancer risks from an imaging study.

*Diagnostic Imaging* spoke with Pandharipande about this research.

Why did you decide to look at the risk associated with disease versus the risk of radiation-induced cancer from CT?

I’m a genitourinary and gastrointestinal radiologist by training, and I read a lot of scans for patients who are being followed with CT after treatment for testicular cancer. As part of my clinical practice, I know they receive a lot of scans at a young age. In collaboration with one of the oncologists here at Massachusetts General Hospital, I became interested in looking at what the radiation-induced cancer risks of those scans were over a lifetime relative to the risks of the disease itself.

When we conducted this analysis, we found that while the lifetime mortality risks from surveillance CT scans are slightly less than from testicular cancer, the loss of life expectancy attributable to the CT scans is much less. This is because of the delayed timing of deaths from radiation-induced cancers relative to deaths from testicular cancer itself.

That’s how this project came about: We want to do the best by these patients, and in that process, we have to try and understand how the risks from CT might affect them. Our goal is to reduce CT-related cancer risks for this patient group, but as a first step, we need to understand how these risks manifest over the lives of these patients.

Why is it important that people are aware of the timing of cancer risks from CT?

The concepts that we present regarding the importance of the timing of radiation-induced cancer risks can be applied to any disease process in which there’s an immediate risk that a physician is trying to avoid through imaging — one that would occur sooner in life than the risk of radiation-induced cancer from imaging. The difference in timing must be considered when you make an imaging decision because timing changes the relevance.

Risks incurred later in life are not the same as those faced in the present. That is the take-home message.

When you boil down this comparison, what is it that policymakers and referring physicians need to realize?

An important element to recognize is that while the metric of “life expectancy loss” does capture the timing of different risks over a population’s lifetime, reported life expectancy loss, in modeling studies, is averaged over a population and isn’t experienced by an individual patient. Most people understand risk as a certain chance of experiencing a particular event in their lives. It’s a challenge to figure out how to explain the importance of timing to a person — to explain what it means and
deconstruct it in a way that’s understandable.
I hope this paper highlights that risks from radiation-induced cancers are conceptually difficult and that more research and effort should be placed on risk communication and physician and patient decision-making. Simply pointing out a risk to someone, be it a physician or a patient, is not enough guidance. We have to include the idea of timing, as well.

**What should be done to enhance the level of understanding about communication of risk?**
At a broader level, one thing that would help is to know more about how physicians who order tests think about risks and how patients conceptualize risk. More research is going into that with regards to radiation-induced cancer risk, but it’s an area that will be increasingly important to ensure that patients have the best imaging decisions made for them. We need to make sure that they don’t get a test they don’t need and incur the risk for no reason. On the other hand, we don’t want to bypass or withhold an imaging test that would be useful to their care and which would provide a net benefit to their life.

We need to do more research into understanding how patients and physicians conceptualize risk to know where to best target our education efforts. This paper points out one way in which these risks are complex and difficult to conceptualize by nature.

**Is this research translatable to other cancers?**
One has to be careful in that to really understand the magnitude of risk, you must do a similar study for each cancer. It’s not one-size-fits-all. You need to weigh the risk from the cancer, which has to do with the stage and aggressiveness of the tumor, and the risk from the scans. It’s the concept of thinking about a health risk manifesting in the short or immediate term versus later in life that can be applied to any health care situation.

But to really understand the explicit magnitude of the risk and the relative relationships of different risks, you’d want to do this type of study for the specific cancers of interest. That’s something that my group and others will pursue, as well.

**How can this information be used to impact patient care?**
I think it comes back to the issue of timing. My hope is that our paper will bring to the forefront the fact that when you’re thinking about doing an imaging test to avert a serious, immediate health risk — and the serious health risk is the question at hand — that imaging is usually indicated. The physician and the patient should recognize equally that CT scans are thought to be associated with radiation-induced cancer risks and shouldn’t be done unless the study is indicated. If a study is indicated, they must recognize that the risk from a CT scan isn’t the same as the risk they’re trying to avert in the here and now with respect to its timing. I hope understanding the timing issue will help with decision making at that level.

**What impact will radiologists and other physicians see?**
I hope this research further equips physicians and radiologists with an attribute of radiation-induced cancer risks that allows them to promote the rational use of imaging. It’s about understanding the nature of these risks well so that you do what is best for your patient. The better you understand radiation-induced cancer risks and how they play out, the better care you’ll be able to provide. My hope is this adds to that level of decision making.

It’s also important to recognize that imaging risks from CT or ionizing radiation are, from the best we know, associated with radiation-induced cancer risks. These risks are low, to the best of our knowledge, but we have to assume their presence. So, it’s important to me that this work doesn’t ultimately encourage people to underemphasize the risk of radiation. It should, instead, promote the rational use of imaging that involves radiation.

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